CBSE Test Paper 02

CH-11 Herons Formula

1. The perimeter of an equilateral triangle is 48 cm. Its area is
   a. $60\sqrt{3}$ sq cm
   b. $72\sqrt{3}$ sq cm
   c. $64\sqrt{3}$ sq cm
   d. $18\sqrt{3}$ sq cm
2. If the perimeter and base of an isosceles triangle are 11 cm and 5 cm respectively, then its area is
   a. $\frac{5}{2}\sqrt{11}\ cm^2$
   b. $\frac{5}{4}\sqrt{11}\ cm^2$
   c. $\frac{5}{8}\sqrt{11}\ cm^2$
   d. $5\sqrt{11}\ cm^2$
3. If the height of a parallelogram having 500 cm^2 as area is 20 cm, then its base is of length
   a. 50 cm
   b. 25 cm
   c. 20 cm
   d. 15 cm
4. The sides of a triangular flower bed are 5 m, 8 m and 11 m. the area of the flower bed is
   a. $21\sqrt{4}\ \ m^2$

b. $4\sqrt{21}\ m^2$

c. $\sqrt{300}\ m^2$

d. $\sqrt{330}\ m^2$

5. The area of a right-angled triangle is 20 m^2 and one of the sides containing the right triangle is 4 cm. Then the altitude on the hypotenuse is

   a. 10 cm

   b. $\frac{10}{\sqrt{41}}cm$

   c. $\frac{20}{\sqrt{29}}cm$

   d. 8 cm

6. Fill in the blanks:

   An isosceles right-angled triangle has area of 8 cm^2, then the length of its hypotenuse is _____.

7. Fill in the blanks:

   The sides of a triangle are 25 cm, 17 cm and 12 cm. The length of the altitude on the longest side is equal to _____.

8. Find the length of each side of an equilateral triangle having an area of $9\sqrt{3}$ cm^2.

9. Find the area of an isosceles triangle having base 2 cm and the length of one of the equal sides 4 cm.

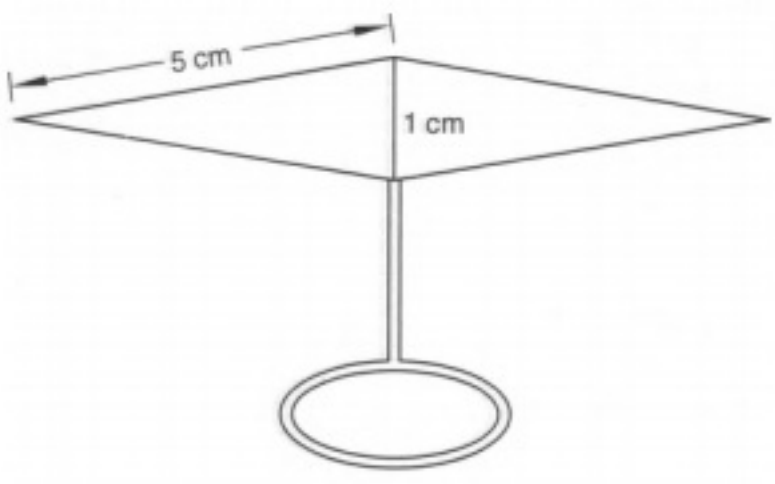
10. Calculate the area of quadrilateral ABCD when length of the diagonal AC = 10 cm and lengths of perpendiculars from B and D on AC be 5 cm and 6 cm respectively.

11. If the area of an equilateral triangle is $16\sqrt{3}$ cm^2, then find the perimeter of the triangle.

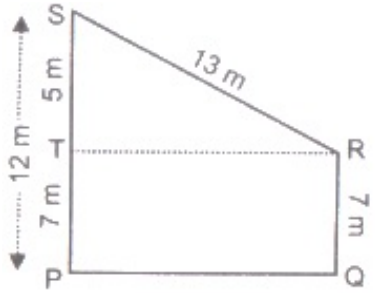
12. If the area of an equilateral triangle is $36\sqrt{3}cm^2$, find its height.

13. In a $\triangle$ABC, AB = 15 cm, BC = 13 cm and AC = 14 cm. Find the area of $\triangle$ABC and hence its altitude on AC.

14. Find the area of the blades of the magnetic compass shown in a given figure. (Take $\sqrt{11}$ = 3.32).



15. Find the area of the trapezium PQRS with height PQ given in Figure.



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Solution

1. (c) $64\sqrt{3}$ sq cm **Explanation:** Side= $\frac{48}{3}$ = 16 cm

   Area = $\frac{\sqrt{3}}{4} \times 16 \times 16 = 64\sqrt{3}$ sq cm

2. (b) $\frac{5}{4}\sqrt{11}\ cm^2$

   Explanation: Let each of the equal sides be x cm.Then

   x + x + 5 = 11

   $\Rightarrow$ 2x = 6

   $\Rightarrow$ x = 3 cm

   s = $\frac{3+3+5}{2} = \frac{11}{2}$ cm

   Area = $\sqrt{s\left(s-a\right)\left(s-b\right)\left(s-c\right)}$

   = $\sqrt{\frac{11}{2}\left(\frac{11}{2}-3\right)\left(\frac{11}{2}-3\right)\left(\frac{11}{2}-5\right)}$

   = $\sqrt{\frac{11}{2} \times \frac{5}{2} \times \frac{5}{2} \times \frac{1}{2}}$

   = $\frac{5}{4}\sqrt{11}$ sq. cm

3. (b) 25 cm

   Explanation: Area of parallelogram = Base x Height

   $\Rightarrow$ 500 = Base x 20

   $\Rightarrow$ Base = 25 cm

4. (b) $4\sqrt{21}\ m^2$ **Explanation:** s = $\frac{5+8+11}{2}$ = 12 m

   Area of triangle = $\sqrt{s\left(s-a\right)\left(s-b\right)\left(s-c\right)}$

= $\sqrt{12\left(12-5\right)\left(12-8\right)\left(12-11\right)}$

= $\sqrt{12\times7\times4\times1}$

= $4\sqrt{21}$ sq. m

5. (c) $\frac{20}{\sqrt{29}}cm$

   Explanation:

   Area of right angle triangle = 20 sq. m

   $\Rightarrow$ $\frac{1}{2}$ x Base x Height = 20

   $\Rightarrow$ $\frac{1}{2}$ x Base x 4 = 20

   $\Rightarrow$ Base = 10 cm

   Then, Hypotenuse = $\sqrt{10^2+4^2}=2\sqrt{29}$ m

   If the altitude drawn to the hypotenuse of a right-angle triangle, then

   the length of required altitude = $\frac{10\times4}{2\sqrt{29}}=\frac{20}{\sqrt{29}}$ cm

6. $4\sqrt{2}$

7. $100\sqrt{3}$ m^2

8. If the side of an equilateral triangle is a.

   Then, Area of equilateral triangle $=\frac{\sqrt{3}}{4}a^2$

   $\frac{\sqrt{3}}{4}a^2=9\sqrt{3}\text{cm}^2$

   $\Rightarrow$ a^2 = 36 cm^2

   $\Rightarrow$ a = 6 cm

   Hence the side of equilateral triangle is 6 cm.

9. Base = a = 2cm and equal side = b = 4cm

   Area of isosceles triangle $=\frac{a}{4}\sqrt{4b^2-a^2}$

   $=\frac{2}{4}\sqrt{4\times4^2-2^2}=\frac{2}{4}\times\sqrt{60}$

   $=\frac{2}{4}\times2\sqrt{15}$

$= \sqrt{15}\,\text{cm}^2.$

10. Area of quadrilateral ABCD

= Area of triangle ABC + Area of triangle ADC

= $\frac{1}{2}$ × Base × Height + $\frac{1}{2}$ × Base × Height

= $\frac{1}{2}$ × 10 × 5 + $\frac{1}{2}$ × 10 × 6

= 25 + 30 = 55 cm^2

11. It is given that area of an equilateral triangle is $16\sqrt{3}$ cm^2.

Side of an equilateral triangle = a

Area of an equilateral triangle $= \frac{\sqrt{3}}{4}a^2$

$\Rightarrow \frac{\sqrt{3}}{4}a^2 = 16\sqrt{3}$

$\Rightarrow$ a^2 = 64

$\Rightarrow$ a = 8 cm.

Perimeter of an equilateral triangle = 3a = 3 × 8 = 24 cm.

Hence the perimeter of an equilateral triangle is 24 cm.

12. It is given that the area of an equilateral triangle is $36\sqrt{3}\text{cm}^2$

Let side of equilateral triangle is a cm.

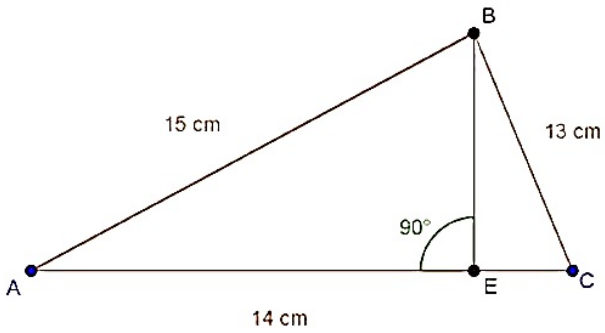
Area of an equilateral triangle $= \frac{\sqrt{3}}{4}a^2$

$\frac{\sqrt{3}}{4}a^2 = 36\sqrt{3}$

$\Rightarrow \quad a^2 = 4 \times 36$

$\Rightarrow a = \sqrt{4 \times 36} = 12\text{cm}$

The height of the equilateral triangle $= \frac{\sqrt{3}}{2}a = \frac{\sqrt{3}}{2} \times 12 = 6\sqrt{3}\text{cm}$

13. 

We have,

AB = 15 cm

BC = 13 cm

AC = 14 cm

Now,

Perimeter = 2s = AB + BC + AC

$\Rightarrow$ s = $\frac{1}{2}$ (AB + BC + AC)

= $\frac{1}{2}$ (42) = 21 cm

$\therefore$ Area of triangle = $\sqrt{s(s-a)(s-b)(s-c)}$

= $\sqrt{21(21-15)(21-13)(21-14)}$

= $\sqrt{21 \times 6 \times 8 \times 7}$

= $\sqrt{21 \times 8 \times 42}$ = 84 cm^2

Let BE be perpendicular on AC.

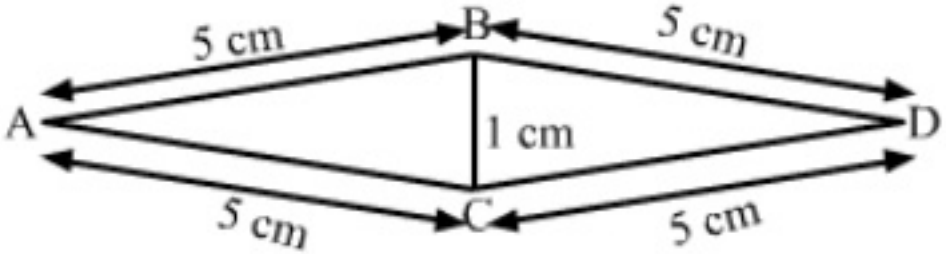
Now, area of triangle = 84 cm^2

$\Rightarrow$ $\frac{1}{2}$ $\times$ BE $\times$ AC = 48 [area of triangle = $\frac{1}{2}$ $\times$ b $\times$ h]

$\Rightarrow$ BE = $\frac{84 \times 2}{14}$ = 12 cm

$\therefore$ Length of altitude on AC is 12 cm.

14.



The blades of the magnetic compass are forming a rhombus having all equal sides of 5 cm.

Area of the blades of magnetic compass = area of $\triangle$ABC + area of $\triangle$CDB

Now for area of $\triangle$ABC,

Let, 2s = AB + BC + CA (perimeter of $\triangle$ABC)

$\Rightarrow$ s = $\frac{1}{2}$ (5 + 1 + 5) = $\frac{11}{2}$ cm

Now, area of ($\triangle$ABC) = $\sqrt{s(s-AB)(s-BC)(s-CA)}$

= $\sqrt{\frac{11}{2}\left(\frac{11}{2}-5\right)\left(\frac{11}{2}-1\right)\left(\frac{11}{2}-5\right)}$

= 2.49 cm^2

Also, area of $\triangle$ABC = area of $\triangle$CDB

$\therefore$ Area of blades of the magnetic field = 2 $\times$ (area of $\triangle$ABC)

= 2 $\times$ 2.49 = 4.98 cm^2

15. Draw RT $\perp$ PS from the figure, it is clear that

ST = PS - PT

= 12 m - 7 m

= 5 m

Now, from right triangle RTS, we have

$RS^2 = RT^2 + ST^2$

$\Rightarrow RT^2 = RS^2 - ST^2 = (13)^2 - 5^2$

$\therefore RT^2 = 169 - 25 = 144 \Rightarrow RT = +\sqrt{144} = 12m$

Now area of trapezium PQRS

$= (PS + QR) \times RT = \frac{1}{2}(12m + 7m) \times 12m$

$= \frac{1}{2} \times 19m \times 12m = \frac{1}{2} \times 228m^2 = 114m^2$